Revue suisse de Zoologie 113 (2): 421-436; juin 2006

A review of *Capoeta tinca*, with descriptions of two new species from Turkey (Teleostei: Cyprinidae)

Davut TURAN[1], Maurice KOTTELAT[2], F. Güler EKMEKÇI[3] &
H. Oguz IMAMOGLU[1]

[1] Karadeniz Technical University, Faculty of Fisheries and Aquatic Sciences, 53100 Rize, Turkey. E-mail: davutturan61@hotmail.com

[2] Corresponding author, Route da la Baroche 12, CH-2952 Cornol, Switzerland (permanent address) and Raffles Museum of Biodiversity Research, National University of Singapore, Kent Ridge, Singapore 119260. E-mail: mkottelat@dplanet.ch

[3] Department of Biology, Faculty of Sciences, Hacettepe University, Beytepe Campus, 06532 Ankara, Turkey. E-mail: gulere@hacettepe.edu.tr

A review of *Capoeta tinca*, with descriptions of two new species from Turkey (Teleostei: Cyprinidae). - Fishes previously referred to *Capoeta tinca* in Turkey and Georgia belong to three species: *C. tinca* in rivers draining to the Marmara Sea, *C. baliki*, new species, in rivers draining to the southwestern Black Sea, and *C. banarescui*, new species, in the Çoruh River drainage. *Capoeta banarescui* is distinguished by missing sexual dimorphism in the mouth shape (present in the two other species) and fewer and larger scales. *Capoeta baliki* is distinguished by its more slender body and caudal peduncle, and blunter head.

Keywords: New species - Cyprinidae - *Capoeta* - Çoruh River - Sakarya River - Kızılırmak River - Anatolia.

INTRODUCTION

Heckel (1843) described *Scaphiodon tinca* from "Brussa in Natolien", the present city of Bursa, in the Nilüfer drainage, a stream flowing to the Sea of Marmara in Turkey. Günther (1868), Steindachner (1897), Berg (1949), and Kosswig & Battalgil (1943) reported this species as *Varichorhinus tinca* from Bursa, Ankara, Esksehir, Sakarya and Trabzon. Karaman (1969) revised the genus *Varicorhinus* and placed *V. tinca* in the genus *Capoeta*. Since, several authors have reported *C. tinca* from central and northern Anatolia (e.g., Kuru, 1975; Balık, 1979; Erk'akan, 1981; Kutrup, 1994). Although these authors examined different populations, all recorded somewhat similar lateral line scale and and gill raker counts.

Banarescu & Herzig-Straschil (1999) redescribed *C. tinca* and mentioned considerable differences between specimens from Çoruh drainage (northeastern Anatolia) and those from western and central Anatolia. We have compared the different populations which have been referred to *C. tinca* and conclude that they are in fact three species. The Çoruh and Sakarya populations are described as two new species, *C. banarescui* and *C. baliki*, respectively.

Manuscript accepted 28.11.2005

MATERIAL AND METHODS

Fish were caught with pulsed DC electrofishing equipment. Material is deposited in: ESFM, Museum of the Faculty of Fisheries, Ege University, Izmir; FFR, Zoology Museum of the Faculty of Fisheries, Karadeniz Technical University, Rize; and CMK, the collection of the second author. Additional material is preserved in the collection of the third author. Measurements were taken with digital calipers (0.1 mm accuracy). Counts and measurements follow Hubbs & Lagler (1947) except as follows. Head width$_1$: distance between anterior margin of eye; head width$_2$: distance between posterior margin of eyes; snout width: measured at level of nostril. Lateral line scale count includes scales on the base of the caudal fin. Vertebae count includes the four Weberian vertebrae and the hypural complex. The last two branched anal and dorsal-fin rays articulating on the same pterygiophore are counted as one.

Capoeta tinca (Heckel, 1843) Fig. 1

Capoeta tinca Heckel, 1843: 1021 (type locality: "Brussa in Natolien"; lectotype: Naturhistorisches Museum Wien 55931:1, designated by Banarescu & Herzig-Straschil, in Banarescu, 1999: 413).

Material examined: FFR 717, 2, 145-157 mm SL; Turkey: Bursa: Nilüfer River, 40°15'N 28°55'E; D. Turan & S. G. Kırankaya, 15 September 2004. - FFR 718, 23, 116-201 mm; CMK 18538, 10, 113-179 mm SL; Turkey: Balıkesir: Koca River, Manyas, 40°05'N 28°02'E; D. Turan & S. G. Kırankaya, 14 September 2004.

Diagnosis: *Capoeta tinca* is distinguished from the other species of the genus by the combination of the following characters: two pairs of barbels; snout rounded; 69-80 lateral line scales; 14-17 scales rows between lateral line and dorsal-fin origin, 12-14 between lateral line and anal-fin origin; 19-23 gill rakers on the first gill arch; lower jaw slightly arched in males, straight in females; head length 23.3-26.7% SL; depth of caudal peduncle 10.8-13.4% SL; head width at posterior margin of eye 49.3-56.5% HL; snout depth at nostril 30.0-41.1% HL; length of anterior barbel 8.1-14.1% HL and posterior barbel 11.5-19.3% HL.

Description: See Figure 1 for general appearance and Tables 1-2 for morphometric and meristic data. Dorsal head profile convex. Snout rounded, blunt, triangular in ventral view, depth slightly smaller than width at nostrils. Mouth wide, shape sexually dimorphic, arched in male, straight in female (Fig. 2). Rostral fold well developed, partly hiding upper lip. Upper and lower lips adnate to jaws, lower jaw covered with horny sheath. No tubercles on head. Anterior barbel not reaching corner of mouth. Posterior barbel reaching about middle of eye. Predorsal profile of body convex. Body high and weakly compressed.

Dorsal fin with 3 or 4 simple and 8 branched rays, outer margin slightly emarginate, origin slightly in front of vertical through pelvic-fin origin, last simple ray moderately ossified, proximal two thirds rigid, and with 24-28 serrae on posterior margin (Fig. 3a). Pectoral fin with 18-20 branched rays. Pelvic fin with 1 simple and 8-9 branched rays. Anal fin with 3 simple and 5 branched rays, outer margin convex. Caudal fin long and deeply forked. Gill rakers, 6-7 + 1 + 12-15 = 19-23 on outer side of first arch, number increasing with size (19, in 6 specimens about 125 mm SL; 20, in 8 specimens about 136 mm SL; 21, in 4 specimens about 145 mm SL; 22, in 5 spe-

FIG. 1
Capoeta tinca, FFR 718, 129 mm SL; Turkey: Koca River.

FIG. 2
Capoeta tinca, FFR 718, female, 129 mm SL (left) and male, 136 mm SL (rigth).

cimens about 160 mm SL; 23, in 2 specimens about 200 mm SL). 69-80 lateral line scales, 14-17 between dorsal-fin origin and lateral line and 9-11 between anal-fin origin and lateral line. 44-46 (modally 45) total vertebrae.

SEXUAL DIMORPHISM: Males collected in September have no tubercles on side and tip of snout, and on cheeks. Mouth slightly arched in male, straight in female.

COLORATION: Live and formalin preserved specimens dark brown on back and flanks, yellowish white on belly. Each scale margined by a band of black pigments, forming a regular reticulated pattern. Dorsal and caudal fins grey; pectoral, pelvic and anal fins whitish.

TABLE 1. Morphometry of the species of the *Capoeta tinca* group and *C. antalyensis*.

Basin	*C. tinca* Marmara Sea		*C. baliki* Southern Black Sea		*C. banarescui* Northeastern Black Sea	*C. antalyensis* Mediterranean
Drainage	Nilüfer R. n=2	Koca R. n=24	Sakarya R. n=25	K›z›l›rmak R. n=10	Çoruh R. n=26	Gökdere R. n=10
In percents of standard length						
Head length	24.6-25.1 (24.8)	23.3-26.7 (24.9)	21.9-24.8 (23.5)	22.5-24.7 (23.6)	22.2-25.8 (24.4)	23.3-26.2 (24.9)
Body depth of dorsal-fin origin	26.0-26.1 (26.1)	24.4-28.0 (26.0)	21.2-24.9 (23.2)	19.8-23.5 (22.0)	21.4-25.1 (23.0)	23.1-25.5 (24.3)
Predorsal length	50.1-51.8 (51.3)	48.0-53.4 (51.0)	48.6-55.5 (51.3)	46.5-53.4 (50.1)	48.7-54.5 (50.6)	50.4-54.2 (52.2)
Postdorsal length	37.1-38.1 (37.6)	34.8-39.3 (37.3)	34.4-38.8 (36.6)	33.3-41.4 (37.4)	34.9-40.1 (37.2)	36.2-38.3 (37.1)
Prepelvic length	53.5-54.3 (53.9)	52.4-57.8 (54.5)	51.8-56.7 (54.1)	51.8-55.3 (53.1)	50.5-57.3 (54.7)	54.3-56.7 (55.7)
Preanal length	76.1-76.7 (76.4)	74.9-79.8 (77.0)	74.7-79.3(77.0)	73.7-82.5 (76.4)	73.3-79.9 (76.3)	76.9-78.8 (77.7)
Pectoral-fin origin to anal fin	54.8-55.2 (55.0)	52.6-57.6 (55.1)	52.3-58.4 (55.3)	45.5-58.4 (53.9)	50.3-58.2 (54.7)	54.8-58.4 (56.1)
Pectoral-fin origin to pelvic fin	29.9-31.6 (30.7)	30.1-34.9 (32.0)	28.9-34.0(32.0)	29.2-34.3 (31.3)	29.1-35.3 (33.0)	31.7-34.2 (33.3)
Pelvic-fin origin to anal fin	22.0-25.7 (23.8)	20.9-26.2 (23.5)	22.1-24.4(23.3)	20.5-25.4 (22.9)	18.5-23.6 (21.5)	21.3-24.3 (23.0)
Dorsal-fin heigth	18.7-19.3 (19.0)	17.4-21.9 (19.2)	15.6-21.1 (18.3)	16.9-20.8 (17.9)	15.9-20.7 (18.6)	16.7-20.1 (18.9)
Anal-fin length	16.2-20.9 (18.6)	17.0-21.7 (18.8)	15.1-21.3 (17.0)	15.2-20.8 (17.9)	15.9-21.8 (18.7)	14.7-18.1 (16.5)
Pectoral-fin length	18.4-18.7 (18.6)	17.3-21.3 (18.9)	16.5-19.5 (18.3)	17.2-19.7 (18.5)	16.2-21.6 (19.4)	17.5-19.4 (18.7)
Pelvic-fin length	16.4-16.6 (16.5)	15.2-17.7 (16.5)	14.4-16.8 (15.8)	14.7-17.4 (15.8)	14.0-17.0 (15.9)	14.4-17.1 (16.1)
Upper caudal-fin lobe	24.3-24.3 (24.3)	22.8-26.6 (24.7)	19.3-24.6 (22.3)	22.8-26.1 (24.9)	20.3-25.5 (22.9)	21.1-24.2 (22.8)
Length of middle caudal-fin rays	13.1-14.8 (13.9)	13.1-15.7 (14.2)	11.6-14.7 (13.4)	13.3-15.7 (14.2)	10.6-15 .1(13.3)	12.3-14.6 (13.4)
Length of caudal peduncule	16.7.0-17.3(16.9)	15.4-18.5 (16.8)	16.0-20.2 (17.6)	16.3-18.2 (17.4)	15.5-19.9 (17.4)	16.9-19.8 (18.4)
Depth of caudal peduncle	11.2-11.4 (11.9)	10.8-13.4 (11.7)	9.7-12.3 (10.9)	9.5-11.1 (10.3)	9.8-11.7 (10.7)	11.2-12.4 (11.6)
In percents of head length						
Snout length	36.7-36.7 (36.7)	33.1-40.4 (37.3)	33.7-40.6 (37.3)	36.2-43.4 (39.6)	35.4-41.2 (38.3)	35.7-41.7 (38.6)
Eye diameter	16.3-16.7 (14.5)	14.2-18.6 (16.3)	13.1-18.8 (15.9)	14.6-19.3 (16.6)	13.2-18.9 (15.1)	16.0-19.0 (17.8)
Interorbital width	36.8-39.9 (38.4)	33.9-42.5 (38.7)	36.3-43.2 (39.5)	38.7-46.1 (42.2)	35.9-42.1 (38.3)	36.5-47.9 (39.8)
Head width$_1$ at anterior margin of eyes	42.1-44.5 (43.4)	39.8-46.5 (43.0)	42.4-49.6 (45.4)	42.4-49.2 (46.1)	40.9-46.8 (43.8)	39.3-44.9 (42.8)
Head width$_2$ at posterior margin of eyes	53.0-55.9 (54.4)	49.3-56.5 (53.1)	55.6-63.5 (59.1)	56.9-62.6 (59.4)	49.4-58.2 (53.8)	53.5-59.3 (56.1)
Head depth at interorbital region	47.6-50.7 (49.2)	45.4-54.4 (49.4)	49.1-59.2 (53.6)	46.5-57.1 (52.2)	45.7-53.3 (49.0)	47.5-52.8 (50.2)
Snout width at nostrils	36.1-39.9 (38.0)	35.9-41.1 (38.3)	35.5-47.6 (40.3)	37.3-44.2 (40.7)	36.4-45.0 (40.4)	34.9-38.9 (37.4)
Snout depth at nostrils	32.5-34.9 (33.7)	30.0-41.1 (34.2)	33.1-41.6 (37.3)	33.5-41.1 (36.9)	29.7-35.1 (32.7)	31.6-37.2 (33.9)
Length of anterior barbel	8.5-9.6 (9.1)	8.1-14.1 (10.6)	9.8-14.3 (12.7)	12.1-18.7 (14.6)	12.4-20.8 (16.9)	14.7-19.2 (16.8)
Length of posterior barbel	11.5-12.2 (11.9)	13.1-19.3 (15.4)	14.7-18.5 (16.5)	16.8-25.5 (20.7)	18.4-28.8 (21.9)	18.6-24.8 (22.3)
Mouth width	27.9-28.6 (28.3)	27.4-34.2 (30.8)	29.5-38.5 (33.3)	28.5-38.3 (33.7)	29.5-37.9 (34.3)	29.2-36.7 (33.8)

TABLE 2. Frequency distribution of meristic features of the species of the *Capoeta tinca* group and *C. antalyensis*.

lateral line scales

	n	51	52	53	54	55	56	57	...	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	$\bar{x}$
C. tinca	25	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	4	2	3	2	4	2	-	2	1	-	-	-	-	-	-	74.9
C. baliki	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	4	2	5	7	4	3	1	1	-	3	1	1	78.4
C. banarescui	25	-	-	-	-	-	-	-	-	1	2	-	1	2	-	2	4	2	4	3	1	-	1	-	-	-	-	-	-	-	-	-	70.8
C. antalyensis	10	1	2	3	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53.6

transverse line scales

		above lateral line										below lateral line					
	n	10	11	12	13	14	15	16	17	$\bar{x}$		7	8	9	10	11	$\bar{x}$
C. tinca	25	-	-	-	-	1	9	10	5	15.7		-	-	16	6	3	9.48
C. baliki	35	-	-	-	-	18	17	5	1	14.9		-	-	-	23	2	10.1
C. banarescui	25	-	-	6	17	2	-	-	-	12.8		-	23	2	-	-	8.1
C. antalyensis	10	2	7	1	-	-	-	-	-	10.9		10	-	-	-	-	7

gill rakers

	n	12	13	14	15	16	17	18	19	20	21	22	23	$\bar{x}$
C. tinca	25	-	-	-	-	-	-	-	6	8	4	5	2	20.6
C. baliki	35	-	-	-	-	2	5	4	6	8	9	1	-	19.3
C. banarescui	25	2	2	4	11	6	-	-	-	-	-	-	-	14.7
C. antalyensis	10	-	-	-	2	6	2	-	-	-	-	-	-	16

	branched dorsal rays				branched pectoral rays					branched pelvic rays			
	n	7	8	9	$\bar{x}$	17	18	19	20	$\bar{x}$	8	9	10	$\bar{x}$
C. tinca	25	-	25	-	8	-	8	16	1	18.8	1	24	-	9.0
C. baliki	35	-	33	2	8.1	4	20	9	2	18.4	-	33	2	9.0
C. banarescui	25	1	23	1	8.0	7	15	3	-	17.8	-	22	3	9.1
C. antalyensis	10	-	10	-	8.0	4	5	1	-	17.7	-	10	-	9.0

Serrae along the posterior margin of the last simple dorsal-fin ray

	n	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	$\bar{x}$
C. tinca	10	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	3	3	26.6
C. baliki	10	-	-	-	-	-	2	1	1	1	1	2	1	-	-	-	-	-	19.5
C. banarescui	10	1	1	1	1	2	1	1	1	1	-	-	-	-	-	-	-	-	16.0
C. antalyensis	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FIG. 3

Last simple dorsal-fin ray of: **a,** *Capoeta tinca*, FFR 718, 139 mm SL, female; **b,** *C. banarescui*, FFR 712, 144 mm SL, female; and **c,** *C. baliki*, FFR 713, 148 mm SL, female.

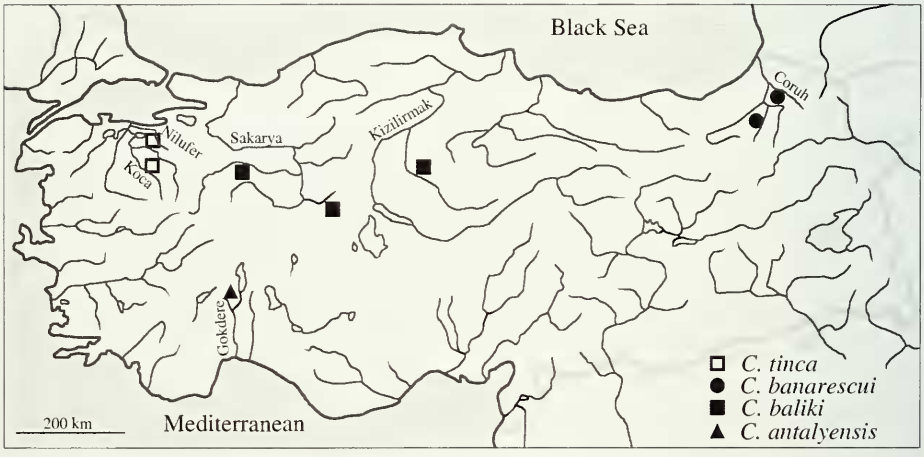

FIG. 4

Distribution of *Capoeta tinca*, *C. banarescui*, *C. baliki* and *C. antalyensis* in Turkey.

DISTRIBUTION: *Capoeta tinca* is known from the rivers draining to the southern shore of the Marmara Sea (Fig. 4).

HABITAT AND BIOLOGY: *Capoeta tinca* inhabits swift flowing water, with cobbles and pebbles bottom. *Alburnoides bipunctatus, Barbus* cf. *oligolepis, Barbus* sp., *Chalcalburnus chalcoides, Rhodeus sericeus, Squalius* cf. *orientalis,* and *Vimba vimba* have been collected together with *C. tinca*.

Capoeta banarescui sp. n. Fig. 5

Capoeta tinca (non Heckel, 1843): Derjugin, 1899 : 155 (in part; Çoruh River, Georgia); Berg, 1914: 0168 (Olty-tchai [Oltu Çayı], Çoruh drainage); Karaman, 1969: 37 (in part; Çoruh drainage: Tortum Reservoir).

Varicorhinus tinca (non Heckel, 1843): Berg, 1914: 554 (Çoruh and Rion drainages), 1949: 684 (in part; Çoruh and Rion drainage, Georgia); Elanidze, 1983: 117 (Çoruh, Georgia).

HOLOTYPE: ESFM-PISI/2004-072, 177 mm SL; Turkey: Artvin: Tortum District: Çoruh drainage, stream Tortum, 100 km north of Erzurum; 40°34'N 41°36'E; D. Turan, F. G. Ekmekçi, H. O. Imamoglu, O. Serdar & S. G. Kırankaya, 19 July 2004.

Paratypes. ESFM-PISI/2004-073, 4, 166-201 mm SL; FFR 712, 16, 85-232 mm SL; CMK 18474, 5, 135-193 mm SL; same data as holotype. - FFR 711, 9, 163-231 mm SL; CMK 18540, 9, 121-193 mm SL; Turkey: Artvin: Çoruh drainage, Bulanık stream, Savsat, 30 km east of Artvin, 41°34'N 42°14'E; D. Turan, F. G. Ekmekçi, H. O. Imamoglu, O. Serdar & S. G. Kırankaya, 19 June 2004. - FFR 720, 3, 92-125 mm SL; CMK 18549, 1, 145 mm SL; Turkey: Çavuslu, Borçka, 41°21'N 41°42'E; D. Turan, 13 October 2004.

DIAGNOSIS: *Capoeta banarescui* is distinguished from the other species of the genus by the combination of the following characters: two pairs of barbels; snout pointed; 64-77 lateral line scales; 12-14 rows of scales between lateral line and dorsal-fin origin, 9-11 between lateral line and anal-fin origin; 12-16 gill rakers on first gill arch; shape of lower jaw not sexually dimorphic; head length 22.2-25.8% SL; depth of caudal peduncle 9.8-11.7% SL; head width at posterior margin of eye 49.4-58.2% HL; snout depth at nostril 29.7-35.1%HL; length of anterior barbel 12.4-20.8% HL and posterior barbel 18.4-28.8% HL.

DESCRIPTION: See Figure 5 for general appearance and Tables 1-2 for morphometric and meristic data. Dorsal head profile convex. Snout pointed, rounded in ventral view, depth smaller than width at nostrils. Mouth large and slightly arched, shape not sexually dimorphic (Fig. 6). Rostral fold well developed, partly hiding upper lip. Middle part of upper lip thick, thinner at corners. Upper and lower lips adnate to jaws, lower jaw covered with horny sheath. Tubercles on lower half of body smaller, denser and larger on lower half of caudal peduncle. A row of large tubercles along branched anal-fin rays. Anterior barbel reaching to below anterior margin of eye, beyond corner of mouth. Posterior barbel reaching beyond middle of eye. Predorsal profile of body convex. Body slightly compressed laterally.

Dorsal fin with 3 or 4 simple and 7-9 (modally 8) branched rays, outer margin straight or slightly emarginate, origin markedly in front of vertical through pelvic-fin origin, last simple dorsal ray weakly ossified, flexible and with 12-20 serrae on posterior margin (Fig. 3b). Pectoral fin with 17-19 branched rays. Pelvic fin with 1 simple and 9-10 branched rays. Anal fin with 3 simple and 5 branched rays, outer margin convex. Caudal fin long and deeply forked. Gill rakers large and rounded, 3-5 + 1 + 8-10 = 12-16 on outer side of first arch, number increasing with size (12, in 2 specimens about 80 mm SL; 13, in 2 specimens about 100 mm SL; 14, in 4 specimens 94-135 mm SL; 15, in 11 specimens 125-154 mm SL; 16, in 6 specimens 143-215 mm SL, including holotype). 64-77 lateral line scales, 12-14 scale rows between dorsal-fin origin and lateral line and 8-9 between anal-fin origin and lateral line. 45-46 (modally 45) total vertebrae.

SEXUAL DIMORPHISM: Males collected in July have well developed tubercles on side and tip of snout, and on cheeks.

FIG. 5
Capoeta banarescui, holotype, ESFM-PISI/2004-072, 177 mm SL; Turkey: Çoruh drainage: Tortum.

FIG. 6
Capoeta banarescui, FFR 712, female, 192 mm SL (left) and male, 178 mm SL (right).

COLORATION: Formalin preserved specimens dark brown on back, flank brown, belly yellowish. Each scale margined by a band of black pigments, forming a regular reticulated pattern. Dorsal, caudal and pectoral fins brown; pelvic and anal fins whitish. In life: back and upper flank brownish grey, belly whitish to yellow.

DISTRIBUTION: *Capoeta banarescui* is presently known only from the Çoruh (Tchorok) River drainage (Fig. 4). The Çoruh originates from the Kaçkar Mountains in Turkey, but its lowermost course is in Georgia and it flows to the Black Sea at Batumi.

HABITAT AND BIOLOGY: *Capoeta banarescui* is known from swift flowing water, with cobbles and pebbles bottom. In June 2004, the temperature was 15-16°C, dissolved oxygen 8.23 mg l^{-1}, pH 7.19, and conductivity 125 mS. *Alburnoides bipunctatus, Barbus tauricus* and *Oxynoemacheilus* sp. were collected together with *C.*

banarescui. Solak (1982) and Yıldırım & Aras (2000) report that *C. banarescui* spawns between May and July in Çoruh. Males collected in May and June have tubercles on the snout and the body. *Capoeta banarescui* feeds mainly on phytoplankton, zooplankton, some invertebrate, algae and other aquatic plants. In stream Oltu, *C. banarescui* reaches 400 mm (fork length), 838 g and 12 years; it reaches sexual maturity at 2-3 years (Yıldırım & Aras, 2000).

ETYMOLOGY: The new species is named for Petru Banarescu, in appreciation for his contributions to the knowledge of the Turkish fish fauna.

Capoeta baliki sp. n. Fig. 7

Varicorhinus tinca (non Heckel, 1843): Kosswig & Battalgil, 1942: 56 (Ankara).
Capoeta tinca (non Heckel, 1843): Erk'akan, 1981: 144 (Sakarya River).

HOLOTYPE: ESFM-PISI/2004-74, 202 mm SL; Turkey: Ankara: Sakarya River: Kızılcahamam Stream, K›z›cahamam, 60 km west of Ankara, 40°29'N 32°39'E; D. Turan & M. Turan, 15 April 2004.

PARATYPES: ESFM-PISI/2004-75, 4, 140-190 mm SL; FFR 713, 5, 121-219 mm SL; CMK 18541, 10, 128-188 mm SL; same data as holotype. - FFR 714, 5, 151-209 mm SL; Turkey: Ankara: Sakarya River, Ova Stream, Kazan, 50 km west of Ankara, 40°11'N 32°39'E; D. Turan & M. Turan, 15 April 2004. - FFR 715, 5, 121-183 mm SL; same data, 16 June 2004. - FFR 716, 10, 168-217 mm SL; Turkey: Sıvas: Kızılırmak River, Delice Stream; F. G. Ekmekçi & S. G. Kırankaya, 22 November 2002.

DIAGNOSIS: *Capoeta baliki* is distinguished from the other species of the genus by the combination of the following characters: two pairs of barbels; snout bluntly rounded; 72-86 lateral line scales; 14-17 scales rows between lateral line and dorsal-fin origin, 10-11 (modally 10) between lateral line and anal-fin origin; 16-22 gill rakers on the first gill arch; lower jaw slightly arched in males, straight in females; head length 21.9-24.8% SL; depth of caudal peduncle 9.5-12.3% SL; head width at posterior margin of eye 55.6-63.5% HL; snout depth at nostril 33.1-41.6% HL; length of anterior barbel 9.8-18.7% HL and posterior barbel 14.7-25.5% HL.

DESCRIPTION: See Figure 7 for general appearance and Tables 1-2 for morphometric and meristic data. Dorsal body profile straight. Snout bluntly rounded, rounded in ventral view, depth slightly smaller than width at nostrils. Mouth wide, shape sexually dimorphic, moderately arched in male, straight in female (Fig. 8). Rostral fold weakly developed, partly hiding upper lip. Upper and lower lips adnate to jaws, lower jaw covered with horny sheath. In males collected in April, tubercles on side and tip of snout. Anterior barbel reaching base of posterior barbel. Posterior barbel reaching to below anterior margin of eye. Predorsal profile of body only slightly convex. Body not compressed laterally.

Dorsal fin with 3 or 4 simple and 8-9 (modally 8) branched rays, outer margin sligthly emarginate, origin in front of vertical through pelvic-fin origin, last simple dorsal ray weakly ossified, rigid on about two thirds of its length and with 17-23 serrae on posterior margin (Fig. 3c). Pectoral fin with 17-20 branched rays. Pelvic fin with 1 simple and 9-10 branched rays. Anal fin with 3 simple and 5 branched rays, outer margin convex. Caudal fin long and deeply forked. Gill rakers 5-7 + 1 + 10-14 = 16-22 on outer side of first arch, number increasing with size (16, in 2 specimens about 116 mm SL; 17, in 5 specimens about 134 mm SL; 18, in 4 specimens about 155 mm

FIG. 7
Capoeta baliki, holotype, ESFM-PISI/2004-74, 202 mm SL; Turkey: Sakarya drainage: Kızılcahamam.

FIG. 8
Capoeta baliki, FFR 714, female, 176 mm SL (left) and male, 164 mm SL (right).

SL; 19-22, in 24 specimens 173-213 mm SL, including holotype). 72-86 lateral line scales, 14-17 between dorsal-fin origin and lateral line and 10-11 between anal-fin origin and lateral line. 43-44 (modally 44) total vertebrae.

FIG. 9
Capoeta antalyensis, FFR 719, 196 mm SL; Turkey: Gökdere stream.

FIG. 10
Capoeta antalyensis, FFR 719, female, 149 mm SL (left) and male, 181 mm SL (right).

SEXUAL DIMORPHISM: Males with breeding tubercles on snout. Mouth slightly arched in male, straight in female.

COLORATION: Formalin preserved specimens dark brown on back, flank brown, belly yellowish brown. Each scale margined by a band of black pigments, forming a regular reticulated pattern. Dorsal, pectoral and caudal fins brown, pelvic and anal fins light brown. In life: back and upper flank brown, belly yellow; caudal, pectoral and pelvic fins dark brown, anal and dorsal fins pale brown.

DISTRIBUTION: *Capoeta baliki* is presently known from the Sakarya and Kızılırmak river drainages, including in lakes and reservoirs (Fig. 4). The Sakarya River originates from western central Anatolia and it enters the Black Sea at Sakarya. Kızılırmak River flows from eastern central Anatolia and and enters the Black Sea at Samsun.

HABITAT AND BIOLOGY: *Capoeta baliki* inhabits slowly flowing water, with cobbles and pebbles substrate. It is also found in lakes and reservoirs, for example Sarıyar Reservoir on Sakarya River (Ekmekçi, 1996) and Gelingüllü Reservoir in Kızılırmak basin (Ekmekçi & Kırankaya, 2004). *Alburnoides bipunctatus, Barbus* sp., *Capoeta sieboldi, Chalcalburnus chalcoides, Squalius* cf. *orientalis, Barbatula angorae, Oxynoemacheilus* cf. *banarescui* were collected together with *C. baliki*. Males collected in June and July have tubercules on the snout. The spawning period in central Anatolia is in May and June. Sexual maturity is reached 2 years for for males and 3 years for females (Ekmekçi, 1996; Ekmekçi & Özeren, 2002). *Capoeta baliki* reaches 428 mm (fork length), 1178 g and 10 years (Yılmaz, 1994).

ETYMOLOGY: Named for Süleyman Balık, for his contributions to the knowledge of the Turkish fish fauna.

DISCUSSION

Species of *Capoeta* have (and still are) often placed in the genus *Varicorhinus*, together with a number of very different cyprinids from Africa, South and Southeast Asia. The type species of *Varicorhinus* is an African fish and the name is correctly used only for African species. The genus *Capoeta* was last revised by Karaman (1969) who recognized seven valid species: *C. tinca, C. fusca, C. pestai, C. buhseri, C. capoeta, C. trutta and C. barroisi*. Banarescu (1999) redescribed some of the species recorded from Turkey and noted problems with the identification of some populations. *Capoeta banarescui* and *C. baliki* are immediately distinguished from most other species of *Capoeta* in having two pairs of barbels, a character shared only with *C. tinca* and *C. antalyensis*.

Varicorhinus tinca was described by Heckel (1843) from Bursa (40°15'N 28°55'E), in the Nilüfer drainage. The Nilüfer is a short coastal stream in northwestern Anatolia, draining to the Sea of Marmara. Banarescu & Herzig-Straschil (in Banarescu, 1999) comment that the distribution of *C. tinca* is disjunct and includes most rivers draining to the Sea of Marmara and the Black Sea basins between the Nilüfer and the Sakarya drainages in Anatolia on the one hand and the Tchorok [Çoruh] drainage in western Transcausia on the other hand. They mention that the Transcaucasian population does not show variability (which relates with its small range and presence in a single drainage). They report considerable differences between the Transcaucasian and the Anatolian populations. These differences include the number of scale in the lateral line, which they record as 67-80 in the Çoruh population and 72-87 in the western and Central Anatolian populations (but they do not provide separate values for the different drainages in this second area). Their data on the Çoruh population (their Transcaucian population) is based on at least 6 specimens from Tortum Reservoir examined by them and 22 specimens from an unknown location from Elanidze (1983). It is not known if

the data were obtained by the same methods. Banarescu & Herzig-Straschil concluded that the two goups of populations represent different subspecies but they did not name the Çoruh one. Examination of our material confirms that they are distinct. They satisfy the criteria of species under the Evolutionary Species Concept (ESC) as they are diagnosable and constitute a distinct lineage (Mayden, 2002; Kottelat, 1997).

Our comparison of material from the Çoruh, Kızılırmak, Sakarya, Koca and Nilüfer rivers shows that the Çoruh material (*C. banarescui*) is immediately distinguished from all others by the absence of sexual dimorphism in the shape of the mouth. In *C. banarescui*, the mouth is regularly arched in both sexes (Fig. 6), while in the other species the male has a small, arched mouth, with the edge of the lower jaw rounded, while the female has a broad, straight mouth, with the edge of the lower jaw sharp (Figs 2, 8). *Capoeta banarescui* also has fewer scale rows between the lateral line and the dorsal-fin origin (12-14, mean 12.8, vs. 14-17, mean 15.7 in *C. tinca*, 14-17, mean 14.9 in *C. baliki*) and the anal-fin origin (8-9, mean 8.1, vs. 9-11, mean 9.5 in *C. tinca*, 10-11 mean 10.1 in *C. baliki*), and fewer serrae along the posterior margin of the last simple dorsal-fin ray (12-20, mean 16.0, vs. 24-28, mean 26.6 in *C. tinca*, 17-23, mean 19.5, in *C. baliki*).

Comparison of the material from the Marmara Sea basin (Nilüfer and Koca drainages) and the southern Black Sea Basin (Sakarya and Kızılırmak drainages) also shows that they are specifically distinct. The type locality of *C. tinca* is Nilüfer River and the species from the Marmara basin retains the name *C. tinca*.

Capoeta banarescui is further distinguished from *C. tinca* by its more pointed snout (vs. blunt and rounded). It further differs from *C. tinca* in having fewer gill rakers on the first gill arch (12-16, mean 14.7, vs. 19-23, mean 20.6), fewer lateral line scales (64-77, mean 70.8, vs. 69-80, mean 74.9), a somewhat more slender caudal peduncle (depth 9.8-11.7% SL, mean 10.7, vs. 10.8-13.4, mean 11.7), a smaller pelvic-anal distance (18.5-23.6% SL, mean 21.5, vs. 20.9-26.2, mean 23.6), a smaller snout depth at level of nostrils (29.7-35.1% HL, mean 32.7, vs. 30.0-41.1, mean 34.1), longer anterior (12.4-20.8% HL, mean 16.9, vs. 8.1-14.1, mean 10.6) and posterior barbels (18.4-28.8% HL, mean 21.9, vs. 11.5-19.3, mean 15.2), and a wider mouth (29.5-37.9% HL, mean 34.3, vs. 27.4-34.2, mean 30.6).

Capoeta banarescui is further distinguished from *C. baliki* by its more pointed snout (vs. blunt and rounded), in having fewer gill rakers on the first gill arch (12-16, mean 14.7, vs. 16-22, mean 19.3), fewer lateral line scales (64-77, mean 70.8, vs. 72-86, mean 78.4), more vertebrae (45-46, vs. 43-44), a somewhat smaller pelvic-anal distance (18.5-23.6% SL, mean 21.5, vs. 20.5-25.4, mean 23.3), a narrower head (at posterior margin of eye (49.4-58.2% SL, mean 53.8, vs. 55.6-63.6, mean 59.2), and a smaller snout depth at level of nostril (29.7-35.1% HL, mean 32.7, vs. 33.1-41.6, mean 37.2).

Capoeta baliki is distinguished from *C. tinca* by having fewer serrae along the posterior margin of the last simple dorsal-fin ray (17-23, mean 19.5, vs. 24-28, mean 26.6), modally fewer scale rows between the lateral line and the dorsal-fin origin (14, vs. 16), fewer vertebrae (43-44, modally 44, vs. 44-46, modally 45), the head shorter (length 21.8-24.5% SL, mean 23.6, vs. 23.3-26.7, mean 24.9) and broader (width at posterior margin of eye 55.6-63.5% HL, mean 59.2, vs. 49.3-56.5, mean 53.1), a some-

what more slender caudal peduncle (depth 9.5-12.2% SL, mean 10.8, vs. 10.8-13.4, mean 11.7), and a much blunter snout (compare Figures 1 and 7).

Varicorhinus antalyensis (Fig. 9) was described by Battalgil (1944) from the area of Antalya (on the southwestern coast of Turkey). Among other characters, it is diagnosed by having two pairs of barbels. Karaman (1969) treated *V. antalyensis* as a synonym of *Hemigrammocapoeta kemali* Hanko (1924). Erk'akan & Kuru (1983) collected *Capoeta* specimens in Aksu and Köprü streams near Antalya which they identified as *V. antalyensis*. They compared them with *H. kemali* and concluded that they are not conspecific and that *C. antalyensis* is a valid species. We examined 25 specimens from Gökdere stream (37°24'N 31°11'E) near Antalya which we identify as *C. antalyensis*. They are immediately distinguished from *C. banarescui*, *C. baliki* and *C. tinca* in having fewer lateral line scales (51-57), fewer scales in tranverse line (10-12/7) and no serration along posterior margin of last simple dorsal-fin ray. In *C. antalyensis* too, the shape of the mouth is sexually dimorphic; the male has a small, arched mouth, with the edge of the lower jaw rounded, while the female has straight mouth (Fig. 10).

COMPARISON MATERIAL

Capoeta antalyensis: FFR 719, 10, 78-236 mm SL; CMK 18522, 6, 108-184 mm SL; Turkey: Antalya: Gökdere Stream, 40°29'N 32°39'E; D. Turan, Z. Turan & S. Engin, 9 September 2004.

ACKNOWLEDGEMENTS

We are pleased to thank Serife Gülsün Kırankaya and Osman Serdar for their help in the field and Semih Engin for figures.

REFERENCES

Balık, S. 1979. Batı Anadolu tatlısu balıklarının taksonomik ve ekolojik özellikleri üzerine arastırmalar [Taxonomical and ecological investigations upon freshwater fishes of Western Anatolia]. *Ege Üniversitesi Fen Fakültesi Ilmi Raporlar Serisi* 236: 1-69 [In Turkish].

Banarescu, P. M. 1999. The freshwater fishes of Europe. 5. Cyprinidae 2. Part I. *Rhodeus* to *Capoeta*. *Aula, Wiesbaden*, 426 pp.

Battalgil, F. 1944. Nouveaux poissons des eaux douces de la Turquie. *İstanbul Universitesi Fen Fakültesi Mecmuasi, Seri B, Tabiî Ilimler* 9: 126-133.

Berg, L. S. 1912-14. [Faune de Russie et des pays limitrophes. Poissons (Marsipobranchii et Pisces). Vol. 3. Ostariophysi]. *Izdatelstvo Akademii Nauk, St-Petersburg*, 1 (1912): 1-336, 2 pls, 2 (1914): 337-704, 4 pls. [In Russian].

Berg, L. S. 1948-49. [Freshwater fishes of the U.S.S.R. and adjacent countries]. *Izdatelstvo Akademii Nauk SSSR, Moskva & Leningrad*, vol. 1 (1948), vols 2-3 (1949). [In Russian; translation: Israel Program for Scientific Translations, Jerusalem, 1965].

Derjugin, K. M. 1899. On the ichthyofauna of southwest Transcaucasia. *Ezhegodnik Zoologicheskogo Muzeya Imperatorskoi Akademii Nauk [Annuaire du Musée Zoologique de l'Académie Impériale des Sciences de St-Pétersbourg]* 1899: 148-171 [not seen, from Berg, 1949].

Ekmekçi, F. G. 1996. [Some of the growth and reproduction properties of *Capoeta tinca* (Heckel, 1843) in Sarıyar Dam Lake (Ankara)]. *Turkish Journal of Zoology* 20: 117-126 [in Turkish].

EKMEKÇI, F. G. & KIRANKAYA, S. G. 2004. Determination of variation in fish growth during reservoir ontogeny: a case study of the mirror carp population in Gelingüllü Dam Lake (Yozgat,Turkey). *Turkish Journal of Veterinary and Animal Sciences* 28: 1129-1135.

EKMEKÇI, G. & ÖZEREN, C. 2003. Reproductivite biology of *C. tinca* in Gelingüllü Reservoir, Turkey. *Folia Zoologica* 52: 323-328.

ELANIDZE, R. F. 1983. Ichthyofauna in the rivers and lakes of Georgia. *Metzniereva, Tbilisi*, 139 pp. [not seen; from Banarescu, 1999].

ERK'AKAN, F. 1981. Sakarya havzası balıklarının (Pisces) sistematigi ve biyo-ekolojik iliskileri üzerine arastırmalar [Studies on systematics and bioecology of fishes (Pisces) of Sakarya Basin]. *PhD Thesis, Hacettepe Üniversitesi, Ankara*, 144 pp. [in Turkish].

ERK'AKAN, F. & KURU, M. 1983. Re-discussion of systematical status of *Varicorhinus antayensis* Battalgil, 1944. *Hacettepe Bulletin of Natural Sciences and Engineering* 12: 49-65.

GÜNTHER, A. 1868. Catalogue of the fishes in the British Museum. Vol. 7. *British Museum, London*, XX + 512 pp.

HANKO, B. 1924. Fische aus Klein-Asien. *Annales Historico-naturales Musei Nationalis Hungarici* 21: 137-158, pl. 3.

HECKEL, J. J. 1843. Ichthyologie (pp. 991-1099). *In:* RUSSEGGER, J. Reisen in Europa, Asien und Afrika mit besonderer Rücksicht auf die naturwissenschaftlichen Verhältnisse der betreffenden Länder, unternommen in den Jahren 1835 bis 1841. Erster Band. Reise in Griechenland, Unteregypten, im nördlichen Syrien und südöstlichen Kleinasien. *Schweizerbart, Stuttgart*, Teil 2: 472-1102.

HUBBS, C. L. & & LAGLER, K. F. 1947. Fishes of the Great Lakes region. *Cranbrook Institute of Science, Bulletin* 26: i-xi, 1-186.

KARAMAN, M. S. 1969. Süsswasserfische der Türkei. 7. Teil. Revision Kleinasiatischen und Vorderesiatischen Arten des Genus *Capoeta* (*Varicorhinus*, partim). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 66: 17-54, pls 1-6.

KOSSWIG, C. & BATTALGIL, F. 1942. Beiträge zur Türkischen Faunengeshichte I. Süsswasserflische. *Türk Fizikî ve Tabiî Ilimler Sosyetesi Yillik Bildırigleri ve Arsivi [Compte Rendu Annuel de la Société Turque des Sciences Physiques et Naturelles]* 8: 32-60.

KOTTELAT, M. 1997. European freshwater fishes. An heuristic checklist of the freshwater fishes of Europe (exlusive of former USSR), with an introduction for non-systematists and comments on nomenclature and conservation. *Biologia (Bratislava)* 52 (Suppl. 5): 1-271.

KURU, M. 1975. Dicle-Fırat, Kura-Aras, Van Gölü ve Karadeniz havzası tatlısularında yasayan balıkların (Pisces) sistematik ve zoocografik yönden incelenmesi [Systematics and zoogeographical study of fishes (Pisces) living in Tigris-Euphrates, Kura–Arax, Van Lake and Blacksea basins]. *Thesis, Atatürk Universitesi, Fen Fakültesi, Erzurum,* 181 pp. [in Turkish].

KUTRUP, B. 1994. Trabzon yöresindeki tatlısu balıklarının taksonomik ve ekolojik yönden incelenmesi [Taxonomic and ecological study of freshwater fish in Trabzon region]. *PhD Thesis, Karadeniz Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Trabzon,* 64 pp. [in Turkish].

MAYDEN, R. L. 2002. On biological species, species concepts and individuation in the natural world. *Fish and Fisheries* 3: 171-196.

SOLAK, K. 1982. Coruh ve Aras havzasında yasayan siraz balılıklarının (*Capoeta* sp.) biyoloji ve ekolojileri üzerinde arastırmalar [Studies on biology and ecology of siraz fishes (*Capoeta* sp.) living in Çoruh and Arax basins]. *Thesis, Atatürk Üniversitesi, Temel Bilimler ve Yabancı Diller Yüksek Okulu, Erzurum,* 135 pp. [in Turkish].

STEINDACHNER, F. 1897. Bericht über die von Dr. Escherich in der Umgebung von Angora gesammelten Fische and Reptilien. *Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien, Mathematisch-Naturwissenschaftliche Classe*, Abt. 1, 40: 685-699, 3 pls.

YILDIRIM, A. & ARAS, S. 2000. Some reproduction characteristics of *Capoeta tinca* (Heckel, 1843) living in the Oltu Stream of Çoruh Basin. *Turkish Journal of Zoology* 24: 95-102.

YILMAZ, M. 1994. Kapulukaya Baraj Gölü (Kırıkkale) 'nde yasayan sazan (*Cyprinus carpio* L., 1758) ve in balığı (*Capoeta tinca* Heckel, 1843) 'nın biyo-ekolojik özellikleri [Bioecological properties of carp sazan (*Cyprinus carpio* L., 1758) and (*Capoeta tinca* Heckel, 1843) living in Kapulukaya Reservoir (Kırıkkale)]. *PhD Thesis, Gazi Üniversitesi Fen Bilimleri Enstitusü, Ankara,* 290 pp. [in Turkish].